

4798

Diag. Cht. No. 4115.

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. 3 Office No. H-4798

LOCALITY

State Territory of Hawaii

General locality West Coast of Hawaii

Locality Puuhoua Point to Kailua Bay

1924/28

CHIEF OF PARTY

T. J. Maher

LIBRARY & ARCHIVES

DATE July, 1923

8-1870-1 (11)

4798

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

C. & G. SURVEY
L. & A.
JUL 2 1928
Acc. No.

REG. NO.

4798

HYDROGRAPHIC TITLE SHEET

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 3

REGISTER NO. **4798**

State ~~Territory of~~ Hawaiian Is.

General locality West Coast of Hawaii

Locality Puuhonua Point to Kailua Bay

Scale 1/20,000 Date of survey March 19 - April 21, 1928

Vessel Steamer GUIDE, motor sailer and whaleboat.

Surveyed by
~~Chief of Party~~ Thos. J. Maher, H. C. Warwick, V. M. Gibbens
Chief of Party

~~Surveyed by~~ Thos. J. Maher

Protracted by H. C. Warwick, V. M. Gibbens, G. W. Lovesee

Soundings penciled by H. C. Warwick, V. M. Gibbens

Soundings in fathoms ~~feet~~

Plane of reference M L L W

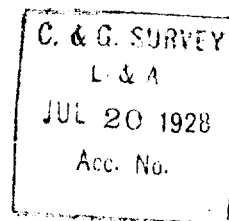
Subdivision of wire dragged areas by

Inked by J. FLEMING

Verified by J. F. Marshall 30 - 1929

Instructions dated November 3, 1928

Remarks: This sheet has 4 ship volumes, 2 motor sailer volumes,
2 whaleboat volumes.



DEPARTMENT OF COMMERCE
U.S. COAST & GEODETIC SURVEY
E. Lester Jones, Director

DESCRIPTIVE REPORT
to accompany
HYDROGRAPHIC SHEET NO.3

4798

WEST COAST OF HAWAII
Loa Point to Kailua Bay

Steamer GUIDE
1928

Thos. J. Maher
Chief of Party

DESCRIPTIVE REPORT
to accompany
Hydrographic Sheet No. 3.

WEST COAST OF HAWAII

LOA POINT TO KAILUA BAY

AUTHORITY: Director's orders dated November 3, 1927.

SCALE: 1 : 20,000.

GENERAL DESCRIPTION: The Coast from Loa Point to Keawekaheka Point is taken up in detail in the descriptive reports of Sheets Nos. 1 and 2. Keauhou Bay and Kailua Bay are described in descriptive report of Sheets 4 and 5 respectively.

In general, the coast in this vicinity is bold, and no dangerous reefs extend offshore, except that small reef just north of the entrance to Keauhou Bay. The coast has a general northerly and northwesterly trend to Kaiwi Point. The coast-line consists of low abrupt lava-flows, which slope gradually to the beginning of the rise of the mountainous interior of the island. At the lower elevations, the area consists of lava-beds, and the sparse vegetation consists of scatterings of coconut-palms. Around the 1,500 feet elevation, the soil is more fertile, and there are large areas of sugar-cane and coffee. The most prominent natural formation in this area is Puu Ohau, which is a green cone-shaped hill, near the beach; the seaward side of this hill forms a high red cliff.

METHOD: The inshore work, from the five-fathom curve out to the ten-fathom and twenty-fathom curve, was accomplished with a whaleboat, using an outboard Johnson Standard Twin Motor. Lines were run parallel to the beach at intervals of not over 100 meters. A hand-lead and line was used for this purpose. A junction was made with this work with the motorsailer, out to a safe distance offshore; where the ship took up the work and extended the survey out to a depth of 1,000 fathoms. The motorsailer took vertical cast soundings with a hand-sounding machine, installed on the boat for this purpose. Lines were run parallel to the beach, at intervals of not over 200 meters. The ship's lines were spaced at 200 meters, one-half mile, one mile, and two miles, in accordance with the instructions for this work. The ship soundings were made, for the most part,

with the fathometer and vertical casts as checks. Pressure tubes were used in conjunction with the fathometer, in depths of less than 100 fathoms. In general, the soundings are uniform, and the tubes and fathometer check quite well. In all cases where these soundings were plotted, the shoaler of the two observed soundings was plotted; except when the shoaler sounding looked erratic. An erratic-looking spot is at Latitude $19^{\circ} 36' 15''$, Longitude $156^{\circ} 01' 30''$; covered by positions 68J to 70J. These soundings do not appear to be correct. This spot should be sounded over; the positions are apparently wrong. } referred in record

The slope corrections to the fathometer soundings were obtained from a graph, constructed on the principle of the report of Lieutenant J. A. Bond for work done by this vessel during 1927. In some instances, due to the rapid change of depth, the slope factor appeared to be excessive. These soundings, where plotted at all, are questioned; and in cases where the factor was greater than 1.45 the sounding was not reduced in the volume. These soundings are left to the decision of the office. A question mark (?) appears on the sheet in the space for the soundings which were not plotted.

The soundings on the boat-sheet were used for obtaining slope factors up to 1.05. Over this, the smooth sheet spacings were used. Considerable time and consideration was given to the selection of the proper slope factor for these soundings; which fact is responsible for delay in not forwarding the sheet to the office at an earlier date.

The tide-reducers were obtained from observations taken by automatic field gauges, established at Kealakekua and Kailua Bays.

The attached tables contain a summary of the temperature and salinity observations for this area, and a table of corrections. The attached curve shows the average temperatures at various depths; and, by combining this curve with the salinity, a correction curve was constructed. These tables and curves constitute a part of this report. This data was compiled by Lieutenant-Commander Thos. J. Maher and Lieutenant (JG) Glendon E. Boothe, and is not taken up in detail in this report.

Respectfully submitted,

H. C. Warwick
H. C. WARWICK
Lieutenant (JG)
C & G Survey.

FORWARDED, approved.

Thos. J. Maher
Thos. J. Maher,
Chief of Party,
Commanding Steamer GUIDE.

LIST OF POSITIONS OF INTERSECTION STATIONS.

NOTE: This list includes only signals located by sextant cuts made by this party. Other signals located by topography and other means are included in the list of positions in the descriptive reports of those other surveys.

NAME	Latitude	D M	Longitude	D P	REMARKS
	°		°		
KIN	19 29	1360	155 57	144	Algeroba bush
LOW	19 30	255	155 57	303	Low brown point
PEAK	19 30	1522	155 57	716	Vertex of high triangular shaped cliff.
RA	19 30	1813	155 57	1103	Lone palm
COT	19 31	846	155 57	1123	Lone palm in trees south of a clump of palms.
NO	19 31	1116	155 57	924	North one of lone palms
SHED	19 32	245	155 55	1387	
SPOT	19 32	353	155 57	938	White spot on cliff
JAC	19 32	693	155 57	936	Shack
RUIN	19 32	1578	155 56	1739	
RED	19 32	1672	155 57	1076	red-roofed house
VIL	19 32	1837	155 57	1225	House north of red-roofed house.
SUP	19 33	396	155 57	1458	Lone palm
NEX	19 35	269	155 58	369	Next to most northerly house on beach
PTT	19 35	636	155 58	647	Low white point.
YEB	19 35	1084	155 58	738	Yellow bush
GRO	19 35	1600	155 58	802	Big tree on beach
RUF	19 35	1839	155 58	964	Red-roofed house
IN	19 36	258	155 58	1102	Large red-roofed house on point
LIN	19 36	489	155 58	1744	Leaning palm on point, farthest off-shore of group.
CAN	19 36	771	155 58	1091	Wind-mill
BAT	19 36	1060	155 58	1243	House
DIS	19 36	1259	155 58	1385	Windmill
DOT	19 36	1685	155 58	1594	House
DUB	19 36	1695	155 58	1687	Northernmost of two houses.
FOX	19 37	298	155 59	430	Palm on point, highest of small group
PROM	19 37	1166	155 59	562	Prominent red-roof house
STONE	19 37	1329	155 59	707	Ruins of stone wall
CLUMP	19 37	1674	155 59	812	North of two clumps of peculiar palms.
GOOD	19 37	1824	155 59	881	House
FAR	19 39	31	156 01	1242	W W on extreme point.

WATER TEMPERATURE
WEST COAST OF HAWAII, APRIL 1928

D	T	S	D	T	S	D	T	S
Fathoms			Fathoms			Fathoms		
333	6.7	24.4	602	4.3	24.1	395	5.7	25.0
545	4.8	23.8	377	5.6	24.9	269	7.4	24.5
528	5.0	24.0	52	23.5	23.8	111	20.7	24.2
71	22.7	23.6	285	7.3	23.8	148	16.0	24.3
215	9.7	24.6	230	9.0	23.8	57	23.3	
389	5.8	23.6	115	21.5	24.4	41	23.8	24.7
215	9.7	24.1	75	23.0	24.3	269	8.0	25.0
78	22.2	24.0	70	23.0	24.2	437	5.4	24.8
265	7.8		65	23.5	24.3	286	7.2	24.4
248	8.1	24.0	27	24.1	24.4	121	9.9	24.8
315	6.3	25.1	3000	6.9	24.4	428	5.9	24.4
220	9.3	25.1	221	8.7	24.5	549	4.9	24.8
480	4.8	24.1	71	23.5	24.6	450	5.5	24.8
602	4.3	24.1	140	10.0	24.3	363	6.1	25.0
349	6.4	24.9	81	23.0	24.0	261	7.9	24.8
343	6.7	24.1	71	23.3	24.0	243	9.0	24.7
257	8.7	24.4	123	23.0	24.2	132	19.8	24.5
166	13.5	24.00	610	4.1	24.0	122	19.3	25.0
250	8.8	24.0	795	3.3	24.3	71	22.9	24.8
197	11.8	24.3	54	23.7	24.0	190	13.5	24.2
195	11.7	24.3	496	5.0	24.0	315	7.0	24.8
198	11.9	24.0	60	23.7	24.0	258	8.4	23.8
193	12.4	23.8	56	23.1	24.0	26	24.0	24.0
152	17.7	24.0	74	23.9	24.3	200	12.0	24.0
262	8.5	23.7	69	23.0	24.0	201	12.3	24.1
184	13.6	23.8	44	23.5	23.8	404	5.5	25.0
239	9.7	24.0	191	11.9	23.9	369	5.8	25.0
230	10.1	24.5	209	10.7	23.5	91	22.6	24.4
281	7.8	24.0	306	7.0	23.7	694	3.7	25.5
			154	14.3	24.6	943	2.8	25.7
1070	3.0					152	16.9	25.3
						554	4.7	25.7
						867	2.8	25.8
						660	4.0	25.7
						782	3.5	25.8

1928

STATISTICS SHEET NO. 3

Soundings								
DATE	Letter	Vol	Positions	V C	Tube	Fathometer	Miles	Vessel
Mar. 20	A	I	26	1		50	5.0	Ship
Mar. 21	B	I	65	131		126	15.0	"
Mar. 22	C	I	80	17	8	141	19.0	"
Mar. 23	D	I	119	7		225	43.0	"
Mar. 24	E	I	43	8		57	9.6	"
Apr. 3	F	II	70	20	17	155	28.7	"
Apr. 4	G	II	92	8	78	219	22.5	"
Apr. 5	H	II	94	9		252	43.0	"
Apr. 12	J	III	136	6		295	52.0	"
Apr. 13	K	III	146	7	121	345	56.0	"
Apr. 20	L	III	117	4	32	225	41.7	"
Apr. 21	M	IV	6	6		5	7.0	"
Total	12	4	994	96	248	2095	342.5	

Apr 4	a	1	90	90			7.4	Motorsailer
Apr 5	b	1	112	112			9.7	"
Apr 6	c	1	87	87			9.5	"
Apr 9	d	1	38	38			3.4	"
Apr 10	e	1	184	184			15.5	"
Apr 11	f	1	99	99			9.0	"
Apr 12	g	2	130	130			12.6	"
Total	7	2	740	740			67.1	

Mar 19	a	1	65	271	8		6.5	Whaleboat
Apr 3	b	1	11	48			1.0	"
Apr 4	c	1	90	409			12.7	"
Apr 6	d	2	86	383			11.4	"
Apr 7	e	2	42	124			4.5	"
Apr 9	f	2	47	182			4.5	"
Apr 10	g	2	86	189			8.1	"
Total	7	2	455	1699			51.5	

Grand Total	26	8	2189	4878			461.1	
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CORRECTION TABLE

Depth	Layer T	Layer V.	Mean V.	Cor. Factor	Inc	Total Cor.
100	16.5	822	822	1.0024	+ .0024	+2.4
300	7.3	810	816	.9951	- .0049	-1.5
500	4.7	807	813	.9915	- .0085	-4.2
700	3.7	810	812	.9902	- .0098	-6.9
900	3.1	812	812	.9902	- .0098	-8.8
1100	3.0	815	813	.9915	- .0085	-9.4

Where did salinity value of 33/1000 come from? According to instructions of April 12 '26 (Fathometer) salinity should be obtained. But no record of such in sounding books. Correspondence in H.T. Division mentions something about getting salinity from Scripps Inst. but as far as I can delve in the correspondence I do not find salinity 33/1000 from C.S. tables. think this was done apparently
 Fathometer velocity 820 fathoms per second.
 Director's letter, dated Nov. 12, 1927 -10LE in water samples taken C.S.

Letter 12/7/27 14 TS remarks about salinity matters.
 Samples of comparative soundings can be used if no other means of determining the proper correction to be applied to echo depth.
 Speed of Fathometer disk. 246 R.P.M. ^{check that}
 Information furnished by lub. man
 Signal Corporation
 J. H. Allen

Letter 11/12/27 10 LE
 states fathometer furnished has gear ratios of 41/200 instead of 40/200 as in earlier machines.
 Inside fathometer has accumulated sound oil 18 in for further
 Table furnished re: ratio of hands machine sent to Capt. Larkin and should be used to correct the fathometer readings.
 Re-mention of salinity in letter

May 24, 1927

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

4421

To the Director of the U. S. Coast and Geodetic Survey

WASHINGTON,

D. C.

Temperature in degrees Centigrade.

24°C
22°C
20°C
18°C
16°C
14°C
12°C
10°C
8°C
6°C
4°C
2°C

Fathoms - Correction

Fathoms - Depth

Depth in Fathoms.

May, 1919
Red curves not checked.
Find no data obtained by this
party for salinity
c.s.
Reviewer

Correction Curve

0 100 200 300 400 500 600 700 800 900 1000 1100

0
1
2
3
4
5
6
7
8
9
10

0 100 200 300 400 500 600 700 800 900 1000 1100 1200

Curve with salinity 35/1000 as shown by field boat measurements

Curve with salinity 33/1000 as shown by field boat measurements

Curve with salinity 35/1000 as shown by field boat measurements

Curve with salinity 35/1000 as shown by field boat measurements

Fathometer and Vertical Cast Comparisons

In depths over 100 fms.
H- 4798

Station Number	Fathometer fms.	Fathometer Corrected for slope, etc. "A. Bond" method	Vertical Casts fms.	Type Echo	Difference betn Cor. Fath. & V.C. fms.	Remarks
1 B	605	?	602			
1 C	215	?	285			
2 C	195	?	230			
33 C	270	?	300			
34 C	140	146	221		+75	
87 C	140	?	206			
40 C	115	124	123		-1	
42 C	147	175	162		-13	
10 D	620	620	610		-10	
43 D	780	780	795		+15	
86 D	490	491	496		+5	
23 E	185	?	191			
25 E	140	?	95			
28 E	193	221	209		-12	Echo Long and Drawn
32 E	317	346	306		-40	
18 F	385	382	370		-12	
19 F	395	471	395		-76	
22 F	145	145	148		+3	
49 F	300	337 ?	269		-68	F taken before lead went down
50 F	420	455	437		-18	
51 F	220, 240, 285	234, 256, 303	286			3 readers
63 F	340, 355, 365, 368	406, 424, 435, 438	428			4 "
64 F	455, 503	515, 559	549	very poor		Wire 7 1/2° slope
66 F	458	510	450	"	-60	
67 F	385	?	363			
68 F	245	293	261		-32	
2 H	135	151	190	echospreadout	+39	
3 H	311	343	315		-28	
4 H	240	253	258		+5	
47 H	220	223	200		-23	
79 H	214	277	201		-76	
33 J	190	194	173		-21	
39 J	495	450	404		-46	
59 J	330	368	369		+1	
81 J	685	692	694		+2	
91 J	935	945	943		-2	T.J. Maher rdy fathometer
20 L	156	179	152		-27	
53 L	528	601	554		-47	
72 L	880	889	867		-22	
1 M	660	659	640		-19	
3 M	793	814	794		-20	
4 M	698	705	730		+25	
5 M	265	?	235	broad echo		
6 M	270	277	301			
						33 867 Average diff. 27 fms.
Depths less than 100 fms O.K. From above data corrected fathometer readings are usually too deep.						

807

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in
volumes of sounding records for

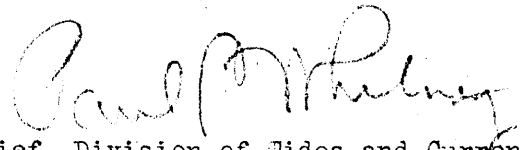
HYDROGRAPHIC SHEET **4798**

Locality: **WEST COAST OF ISLAND OF HAWAII, T. H.**

Chief of Party: **T. J. Maher in 1928.**
Plane of reference is **Mean lower low water, reading**
0.8 ft. on tide staff at **Napoopoo**
1.9 " " " " **Kailua.**

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.


Chief, Division of Tides and Currents.

Field Records Section (Charts)

HYDROGRAPHIC SHEET No. *4798*

The following statistics will be submitted with the
cartographer's report on the sheet:

Number of positions on sheet *2189*
Number of positions checked *639*
Number of positions revised *163*
Number of soundings recorded *7221*
Number of soundings revised *420*
Number of signals erroneously
plotted or transferred *37* *

* Error due to use of two datums on
This sheet

Date: - *March* - *30*, - *1929* -

Cartographer: - *John Fleming*

Remarks, adjustment and explanation, in red are made
by the ~~Reviser~~ - Charles Shaw - and have been discussed and
Field Records Section gone over with
Report on H-4798 - Surveyed 1928 J. Fleming. c.s.

Chief of Party T. J. Maher -
Surveyed by T. J. M. - H. C. Warwick - V. M. Gibbens
Protracted by - H. C. W. - V. M. G. G. W. LOVESEE
Soundings by H. C. W. - V. M. G.
Verified & Inked - J. Fleming

- (1) Records conform to requirements of G. I.
- (2) Plan and character of development fulfill requirements of G. I.
- (3) Sounding line crossings are fair
discrepancies are noted at the following positions:-

7-H to 8-H <sup>Apparently too deep
2 1/2 fathoms in 7 1/2 fms</sup> West of O Go

66-G ^{187 fms} and 12-H ^{210 150 m. away} S.W of O Tank

^{Stop slope at 93 fms. (Motorail... 16 fms. 29)}
93-f and 100-m West of O Far ^{about 2 fms. diff. on each other}

OK. [56-57-J where line crosses 81-82-H (opp. Δ TARGET)
bottom characteristics should have been
determined here. (See Note Page 52-Vol-2)
smooth plotting in error. OK. error.

OK. [33-e (red) and 67-e (blue) ^{16 fms. also another closely crossing about OK.}
In plotting 33-e (red) it is quite certain that
he used O Lot by mistake this position was
out about 300 Meters

32-e (red) where a $5\frac{5}{6}$ Fath Sounding falls on $3\frac{5}{6}$
(In cove near O Sup) ^{Works out OK. when plotted carefully}

also
T. 4354



Field Records Section

Report on - H-4798

(3) continued

At positions 57-58-a^{red} (opp. TWIN inshore) the sounding line run inside of the line represented by 15-16-17-~~18~~^{red} with values of 12 fath for the former and $8\frac{1}{2}$ - $9\frac{3}{4}$ for the latter. a careful replotting made it possible to place these soundings in a more logical relative position. *all right now, etc.*

54-d (red) and 13-9^{red} there is a difference of 2 fath. *12 fms now shows just outside 10 fms*
 (about 400-meters W x N of O'Fox)
More careful plotting of "9" line shows little irregularity, if any at all.

- (4) The field plotting was completed to the extent prescribed in G.D. There was, however, one serious defect which affected practically the entire control.

The control for this sheet was obtained from Topo 4343 - 4344¹⁹¹⁴ - 4355 which are based upon the 'Old Hawaiian Datum' now in use, and Topo 3424¹⁹¹³ which is an older survey based upon a different datum.

It is obvious that the use of all of the above Topo sheets in the construction of control for a Hydrographic sheet without reducing the Datums to a common basis would result in the relative displacement of the signal groups. This is what happened in this case.

The Triangulation was checked and found to be accurate but the the Topo signals in the areas covered by T-3424 had to be shifted on account of the shift in Datum and consequently the hydrographic signals based upon these signals were out also.

✓ H-4787	4344	Feb. 28
✓ H-4768	T 4343	Jan. - Feb 1928
✓ H-4790	4355	April 1928
✓ H-4789	4354	Mar 28 Kaula Bay

The off shore hydrography was not affected by this shift since it was based upon the Triangulation stations which were checked and found accurate. The inshore work was affected to the extent that positions were out in amounts varying from zero to a Maximum of 50 meters in a few spots. All signals from 3424 were corrected and the Hydrographic signals cut in again then the inshore work was replotted entirely with the results indicated on the sheet.

Signals from the old survey T 3424 and identified in the present control are marked *
Signals from recent Topo surveys and based upon the Old Hawaiian Datum and not required to be shifted are marked ⊕

The greatest displacement of positions due to the shift in the control was observed in "a-day" (South of Δ Puu) and West of Δ Target c-day (blue) and opposite "O" SPOT.

That part of the shore line and its attending features represented by a solid line was photographed from the ¹⁹²⁸ Topo sheets ✓ T 4343 - 4 ; T 4355

That part of the shore line represented by a dashed or broken line was traced from T-3424-1913

There is good agreement between Hydrography and Topography except at the following places:-

Near "Z" lag the hydrography shows that the rocky reef extends 100 meters more to seaward than is shown by the topography. ^{usually hydrographic determination and a line is located while top is an estimate as determined by beach looking survey}

At 20-day (opposite O HEN) the difference in the position of low water line as shown by H. and T. is 80 meters. ^{also discrepancy off O Pond between H + T. Should follow hydrographic low water line. Topo low water line too far to seaward}

Isot on the smooth hydrographic sheet seems to appear
from no data for support. Seems to have landed in place from
nothing. On the top sheet at the shore due west as a faint pencil line agreeing
with the Antistat position of C. Isot.

The greatest difference in shoreline is observed at the \odot sig designated as '50' where it amounts to 100-m.

It is noted also that the rock awash at that point has an equal displacement ^{but is in the same direction with respect to the shore.}

The status of the two signals \odot 50 and \odot GET ^{see Vol 5 pp 28} has been uncertain from the beginning and it is thought that conflicting representations of shore line are responsible for the existence of this uncertainty.

It should be noted here that this part of the shoreline was pantographed from the topo. of recent date.

\odot Sig '50' on the Hydro is really \odot GET on the Topo. ^{OK}
The sig referred to as GET on the Hydro ^{H-4798} cannot be located on any sheet and no cuts are given by means of which its position could be established except in Vol -7 Page-2 where a cut is taken to GET.

As a matter of fact the cut is taken to Δ Target ^{OK}

On page 25 Vol-5 ^{see note with page 25} is the first and only use of GET as a part of a fix and this appears to be erroneous. ^{with this notation GET and 50 as plotted on last sheet are in error}

There is a difference in shoreline 150-M North of \odot TAT when comparing with old Topo. (see -19-a-20-a Vol-7 Page 7)

see also old and new shore line between \odot sha and \odot Go. ^{Question of hydrographer estimating distance off beach as he runs along. Estimates should be verified with boat out line.}

The sounding line passed close to or over pinkish rocks near \odot NET ^{without} without being aware of it. ^{shown on T4355?}
^{Smaller rock about 20 meters off shore just west of GET not shown on last sheet}
Line passed rock awash near Δ Signal without detecting it. ^{Position on T4354 but not shown a smooth hydro sheet placed on smooth sheet now}

A bare spot 160-M ^{SW} Δ Target not noted 37-a (red)
^{shown on topo sheet T4354 but not shown on smooth hydro sheet until noted there by Verifier.}

\odot Las printed as \odot Los on H-4798 needs to be changed
 Δ Kawaheka Keka ^{done} misspelled ^{done} should be Kawaheka heka ^{OK}

Datum of sheets

Look up →

Compromise between
H 4769 and bracteolatus
H 4789. This plate about
 $\frac{1}{2}$ N of present road
on H 4798 c.s.

slightly *glowing* *hatched* *red* *12* *1/2* *ray*

From las to sha the ^{correct now. slight smooth plotting inaccurate line. Current agrees with boat sheet} sounding line (inshore) did not agree with the boat sheet. Furthermore OKE is given as a Topo signal. This signal could not be found and it is believed to be a Hydro signal on the rocks which the field party failed to cut in and record.

O TWIN is another sig. shown to be topographic but which is thought to be hydrographic. ^{no data must be unrecd. ad hydro. signal.}

If any rocks were transferred from the old Topo 342x to the large scale sheets of this area it should be determined whether or not the difference in datum was taken into account.

70-M S.W. of Δ point a rock awash is shown on old Topo 342x. This rock does not appear to be the same rock as is shown 45 meters S.W. of Δ POINT on H. 4789. ^{Rock on T 342x, H-4789 and on Trutchet 4789 all plot different. Believe all the same rock. Believe position on Trutchet to be best location as they surround it and the hydrographer would always be watching for it against striking. C.S.}

Pos. - 81 - H Page 52 - Vol. 2 was plotted as $81^{\circ}35'$ instead of $86^{\circ}35'$ which is believed to be the correct angle. The latter setting moves the position a distance of 380 Meters inshore to a point where such soundings may be expected. The protractor operator was probably engrossed with the position number 81.

That part of the sounding line - 24-9-29-9 (rd) was plotted as if the boat were turning right instead of left causing a displacement of 200 Meters in the sounding line. ^{Smooth plotted according to the record now and agrees with Trutchet. OK.}

According to old Topo 342x - two sunken rocks lie West of sig LOW. Note 2 fath. sounding at point the low water line on old Topo reaches out to the 2 fath. sounding on the Hydro. ^{apparently 2 fms between low water line and elevated sunken rocks all are close together. Sunken rocks now placed on H-4789.}

This is not standard practice

(VC should be at 100%)

At position 50-L Page 60 - Vol - 3 there is an error of 20 fathoms in the field correction ✓

At position 116-L Page 70 - Vol 3 there is an error of 200 fathoms in the field correction ✓

In penciling soundings 7 fath. 1 FT was plotted as 7 fath. the same applies to 8 fathoms

Between 9 and 10 fathoms no fractions were plotted except 9 fathoms 5 feet which was plotted as 10 fathoms

Regarding slope correction higher authority has ordered the acceptance of corrections amounting to 15% of the indicated fathometer depth in depths of 300 fathoms or less and 10% of indicated fathometer reading in depths exceeding 300 fathoms. Values exceeding the above to be noted on the sheet in a suitable manner.

Therefore all soundings exceeding the above values are in pencil only.

Vertical cast soundings are indicated with a pencil circle around them thus (632)

Tube soundings have a pencil dash under them ^{then} - 73

The overlap ^{apparently fathometer reading at L15 (Hydro) reads 2 1/2 fms too} to H - 4768 - 4789 - 4790 ^{depth is} considered very good ^{except that part of the} sounding line ^{crossing KEANUO BAY containing 18 fath soundings} and a 3 1/2 fath sounding west of Kahalo. ^{on edge of shore reef} ^{where it drops off to 9 fms apparently at end}

Respectfully submitted

J. Fleming

March - 28 - 1929

ADDRESS THE DIRECTOR

U. S. COAST AND GEODETIC SURVEY

AND REFER TO NO.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
WASHINGTON

June 7th, 1929.

SECTION OF FIELD RECORDS

Report on Hydrographic Sheet No. 4798

West Coast of Hawaii Island - Loa Pt to Kailua Bay

Surveyed in 1928

Instructions dated November 3, 1927 (Guide)

Chief of Party, T. J. Maher.

Surveyed by T. J. M., H. C. Warwick and V. M. Gibbons.

Protracted by H. C. W., V. M. G. and G. W. Lovesee.

Soundings by H. C. W. and V. M. G.

Verified and inked by J. Fleming.

1. The records conform to the requirements of the General Instructions with three exceptions. Looking up all correspondence with the Guide in 1928 in the office, it appears samples were supposed to be furnished Sipp's Institute for salinity determination. There appears no record of salinity samples taken. It is probable that this party had past data which permitted the use of $33 \frac{0}{0-0}$ salinity, as the average value around the Hawaiian Islands. Salinity should be known for each sounding within one part in one thousand, according to general instructions. The salinity correction is as a rule of minor importance so long as approximate salinity is known. This is illustrated by the red pencil curves for $31 \frac{0}{0-0}$ and $35 \frac{0}{0-0}$ salinity drawn by me in conjunction with the field party's salinity curve of $33 \frac{0}{0-0}$ in the Descriptive Report. Temperature values are very important and these

were obtained.

In many cases the "check mark at the extreme right hand edge of the left hand page just to the right of the bottom column" in the records is not entered. This mark is supposed to show that the tachometer is vibrating correctly at maximum amplitude and the readings are coming in correctly for the fathometer rated speed. See notes later under Additional Remarks page 7.

The line ends and line begins are not filled in completely in the record books.

2. The plan and character of development conform to the requirements of the General Instructions except as regards fathometer values in areas of excessive slope. This is taken up further under paragraph number 10.

3. The plan and extent of development satisfy the specific instructions except as follows. Sounding lines as a general statement are much closer than instructions required altho this is perhaps permissible under paragraph number 14 of the Instructions.

** This was criticised by
Dir H & T verbally. ans.*

A short sounding line running down the meridian $155^{\circ} 04'$ between latitude $19^{\circ} 38'$ and $19^{\circ} 34'$ would have filled in that area better to comply with spacing instructions there.

There is no record of bottom specimens having been taken every 5 miles out to the 1000 fathom curve as mentioned under paragraph number 17 of the Instructions.

4. In the shoaler water under about 100 fathoms the sounding line crossings are very good. In five instances in shoal water near the shore more careful plotting rectified apparent inadequate crossings. At 7 H to 8 H (ship) the depths are 2 to 4 fathoms too deep in water greater than 35 fathoms depth. Soundings here enough. Advise reject.

Reject. ans.

At 66 G and 12 H (ship) the depths differ about 2 fathoms in water about 20 fathoms deep. The shoaler depth is plotted as it is obtained by two tubes, and the deeper is fathometer.

Aside from the deeper fathometer soundings in pencil on H4798, which are at excessive slopes, and which an uncertain value is apparent, the crossings on the whole are good.

5. The usual depth curves can be drawn but with the uncertainty of fathometer values along the 200 fathom curve due to slope this curve is open to doubt in several places.
6. The field plotting was completed to the extent prescribed by the General Instructions except as noted below.

The control for this sheet was obtained from T 4343, T 4344, T 4354 and T 4355, all of 1928, and T 3424 of 1913, which latter sheet is based upon a different datum. The 1928 topography was based upon the Old Hawaiian Datum now in use. As the datum on the 1913 sheet was not reduced in the field to the common basis, displacement of some of the signals resulted. All signals from T 3424 were corrected and the hydrographic signals cut in again by J. Fleming, Cartographic Engineer. Then the inshore work was replotted entirely, dependent upon these signals, and the position errors were found to be from nothing to a maximum of 50 meters in a few spots. The greatest displacement of positions due to the shift in the control was observed in "a" day south of Δ Puu, and west of Δ Target on "c" day (blue), and opposite \odot Spot. The triangulation plotting was checked and found to be accurate. As the offshore hydrography was based upon this, no changes were necessary.

That part of the shoreline and its attending features represent-

ed by a solid line was pantographed from the 1928 topographic sheets mentioned above. The shoreline represented by a dashed or broken line was traced from T 3424. Signals from T 3424 and now corrected are marked after the name on H 4798 in pencil thus * . Signals from other topographic sheets on the correct datum are marked after the name on H 4798 in pencil thus @ .

Altho not standard practice up and down soundings are indicated by a pencil circle around the sounding, and pressure tube soundings have a pencil dash below them.

7. There is a good agreement between the hydrographic and topographic sheets except at the following places.

Near O Flag the rocky reef extends offshore 75 meters on the topographic sheet but 150 meters on the hydrographic sheet. Usually such as here the hydrographic determination is correct while the other is an estimate while looking seaward.

Near 20 d (red) O Hen and near O Bud (Bad) the low water line differs on the two sheets. Should follow the hydrographic sheet low water line.

The greatest difference in shoreline is observed at O So (Get) where it amounts to 100 meters with correct datums. A rock awash here has an equal displacement but it is in the same location with respect to each determination. The 1928 shoreline at O So and the rock is about 100 meters south of the 1923 topography. The 1928 work has better triangulation control, and should be used.

O SO H 4798 is O GET T 4354.

Rock awash 300 meters W x N of A Signal was formerly omitted from the hydrographic sheet but was on the topographic sheet 4354.

Some inshore sounding between O Las and O Sha; position 81 H (ship) ;

and inshore sounding between 24g and 29g (red) were incorrectly plotted by the ship plotter but were corrected and now agree with the records and the boatsheet.

○ Oke and ○ Twin are topographic signals on H 4798 but are believed to be hydrographic signals with angles unrecorded in the records.

The rock awash 50 meters SW of Δ Point has been moved north 15 meters on H 4798. It is quite certain the rock here on T 3424; H 4798 and on boatsheet 4798, while all plotted somewhat different, are the same rock.

Two sunken rocks about 60 meters west of ○ Low previously omitted were placed on H 4798.

8. The junctions with adjacent sheets are satisfactory. This includes H 4768; H 4787; H 4789 and H 4790. There are no offshore hydrographic sheets as yet overlapping H 4798 at either the northern or southern extremities.

At 15 H day (ship) crossing Keauhou Bay there are two 18 fathom soundings with the fathometer that appear to be read too deep by $2\frac{1}{2}$ fathoms, as the whaleboat soundings and the motorsailor soundings hereabouts check each other at the shoaler depths. These two soundings have been rejected. ✓

At position 23 F day (ship) there is a sounding of 133 fathoms which has been restored to the sheet and the depth curves altered. There is no reason for omitting this sounding.

The two fathometer soundings of 180 and 148 fathoms between 103 D and 104 D day (ship) are rejected as they were obtained on a large swinging course, and indefinitely located.

9. I do not consider the fathometer soundings satisfactory along the

300 fathom curve where the island shelf drops off into deeper water with steep slope. Additional accurate^{work} should be done as mentioned below under Remarks if my solution there is not believed acceptable.

10. Remarks.

Methods of handling depths obtained with the fathometer on steep slopes are as yet in a state of flux and corrected values are very difficult to determine satisfactorily. In fact if the true depth must be determined as for scientific purposes the fathometer method is not suitable for steep slopes due to the depth normal to the slope being obtained, such slope being knowable only approximately. Perhaps with sufficient study the maximum slope at which fathometer soundings can be reduced sufficiently accurate may be determined, and all soundings thereafter over this limit to be taken with either the pressure tube or vertical casts.

Up to the present status of this H 4798 sheet fathometer soundings have been accepted and inked where the slope corrections are not over 15% of the indicated fathometer depths in depths not over 300 fathoms, and where corrections are not over 10% in depths over 300 fathoms.

As I understand tests have been conducted in the office with officers showing that the personal equation of reading the deep values of the fathometer (white light) are as large as 40 or 50 fathoms, it does not seem unreasonable to use the arbitrary limits of 10% and 15% corrections as above, and are recommended for adoption on this sheet.

Most of the slope corrections have^{much} smaller percentages than the 10% and 15%.

With the fathometer soundings in pencil on H 4798, that is those with corrections exceeding the above percentages, it is recommended *

* See note last page

that these depths be re-computed using Capt. Parker's graph, C. & G. S. Print 357, where within its limits, and the method explained by me on the appended onion paper be used. This method is an average of the graph depths at each fathometer sounding obtained from the surrounding fathometer depths, or if necessary in some instances to depth curves. This gives an average value from the surrounding slopes and is not dependent upon only one slope direction, as I believe used heretofore. As shown in the example on the onion paper these values at each fathometer sounding from the different slopes check remarkably well I believe when within the limits of the graph as constructed.

Fathometer soundings in pencil a few of which may not give suitable results should be rejected.

If this re-computing the pencil soundings is impracticable from the standpoint of volume of additional work, which I believe with the graph is not large, it is recommended that the pencil soundings be all rejected, and some additional vertical casts only be taken along the 200 to 300 fathom curve area from Kealakekua Bay south-eastward about 3 miles when hydrography is resumed south of this sheet.

This graph, Print 357, would be better for this sheet if the graph was extended to cover fathometer soundings as close as 175 or 200 meters apart instead of the 275 meters at present, and if the 5 to 555 curves representing difference of adjacent soundings were extended in length down another 6 inches or more at the bottom of the graph.

Additional Remarks.

As I understand the notation in the record books as on page 21,

vol. 1, " Mark✓ (REED) indicates that the third reed from the left vibrated- Fathometer could not be speeded up sufficiently to make center reed vibrate" means that all the fathometer work with the check mark was done not at the rated speed of the fathometer disk 246 R P M, or assumed sound velocity of 820 fathoms per second. Some days there are no check marks for the reed, and other days there are check marks without the above notes. Check marks without any qualifying note should mean according to the Regulations that the fathometer center reed (one to the right of the third reed) is vibrating and therefore the apparatus is working as rated.

As shown on page 68 of the Hydrographic Manual, which was issued to the field I think just after this survey, under the box " Vibratory Tachometer " with a fathometer rated at a sound velocity of 800 fathoms per second the third reed vibrating from the left would give a sound velocity of 793 fathoms per second, and the machine not working at the rated condition. No data is available ^{in the Manual} for the difference in velocity of such conditions for an 820 fathom velocity machine.

This affects the velocity of sound values as computed in the Correction Table at the back of the Descriptive Report. It is believed this error is of minor importance, but it has not been computed. When the center reed of the fathometer is vibrating the fathometer is operating at a speed corresponding to the standard sound velocity for the apparatus, here 820, and the correction factors for the velocity of sound in salt water as given on page 159 of the Manual are then applicable.

While it is not usually difficult to read the fathometer under about 100 fathoms the question naturally arises in connection with the deeper uncertain fathometer readings whether or not officers only

should be detailed to read the fathometer. In the case at hand the Recorder read the fathometer practically entirely, so far as the records show. While of course he may be an excellent fathometer man, when there are questionable results, such facts that an officer did not read the fathometer, should be brought out. As far as apparent however all the principal difficulties of the depths are due to the slope.

There is a sheet appended showing the fathometer corrected for slope, and vertical cast comparisons over 100 fathoms in depth. The differences are erratic.

It is my recollection when serving on the Pioneer in 1925, on which ship there was no fathometer, that the sonic depth finder obtained excellent results in depths greater than about 100 or 200 fathoms by comparison with the vertical casts. In this work the problem of slope did not arise. The sonic depth finder was unsatisfactory in depths less than about 100 fathoms.

From the experience on the Surveyor in 1927, on which ship there was no sonic, my recollection is that under about 100 or 200 fathoms the fathometer comparisons with the vertical casts checked remarkably well, but over these depths the comparisons were unsatisfactory.

Experience to date in reviewing this sheet further confirms my earlier opinion that these two sounding methods so far as at present perfected complement each other in working depths.

I have gone into the review of this sheet as minutely as time allowed before going back into the field again, both to point out fathometer survey salient points for reviewers, to try and

help solve the slope problems, at least somewhat, and also for my own benefit in understanding the field and office problems of the finished fathometer sheets.

Reviewed by *Charles Shaw*
Charles Shaw, June 1929.

Approved:

Chief, Section of Field Records (Charts)

Chief, Section of Field Work (H. & T.)

Note: The method recommended consists in computing slope correction from all adjacent soundings - each one giving a different value - and taking the mean. It would be more logical to take the largest correction. On account of the work involved and the relative unimportance of the soundings involved, all soundings under 300 fathoms having a slope corr. as computed by field party in excess of 15% and all sdgs under 300 faths with slope corr in excess of 10% were rejected.

*A. M. Sobieralski
Chief Section of Field Records*

help solve the slope problems, at least somewhat, and also for my own benefit in understanding the field and office problems of the finished fathometer sheets.

Reviewed by Charles Shaw, June 1929.

Approved:

A. M. Sobieralski
 Chief, Section of Field Records (Charts)

Chief, Section of Field Work (H. & T.)

Note: The method recommended (p. 6) consists in computing slope corrections from all adjacent soundings, instead of only maximum slopes, each slope giving a different value - and taking the mean. It would be more logical to take the largest correction, which is the same as taking the maximum slope. On account of the work involved in recomputing slope corrections and the relative unimportance of the soundings involved, all soundings under 300 faths having a slope corr. in excess of 15% (as computed by field party) and all sd go over 300 faths with slope corr. in excess of 10% were rejected and have been omitted from the sheet. The investigation apparently indicates that the method used by the party for computing slopes is not accurate.

A. M. Sobieralski

Applied to compilation 4140 J.M.A. May 1941